

**EFFECT OF POLYMER BASED ORAL REHYDRATION
SOLUTION FOR THE MANAGEMENT OF DIARRHEA AMONG
CHILDREN IN A SELECTED RURAL HOSPITAL, GUDALUR.**

REG. NO. 30091432

A Dissertation submitted to
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EFFECT OF POLYMER BASED ORAL REHYDRATION SOLUTION FOR THE MANAGEMENT OF DIARRHEA AMONG CHILDREN IN A SELECTED RURAL HOSPITAL, GUDALUR.

1.

Prof. (Mrs). W. Chitra, M. Sc (N),
Department of Community Health Nursing,
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore - 641 044.

2.

Dr. G.K. Sellakumar, M. A., M. Phil., PGDPM., Ph. D.,
Professor in Psychology & Research Methodology,
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore - 641 044.

3.

Dr. S.L. Ravi Shankar, M.B.B.S., M.D.,
Department of Community Health Medicine,
PSG Institute of Medical Science and Research,
Coimbatore – 641 014.

Certified that this is the bonafide work of

LINDA FARIA

COLLEGE OF NURSING

Sri Ramakrishna Institute of Paramedical Sciences
Coimbatore - 641 044.

Submitted in partial fulfillment of the requirement for the award of the degree of

MASTER OF SCIENCE IN NURSING

to The Tamilnadu Dr. M.G.R. Medical University, Chennai.

College Seal

Prof. (Mrs.) SEETHALAKSHMI,
B.Sc., R.N., R.M., M.N., M.Phil., (Ph. D).,
Principal,
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore - 641 044,
Tamilnadu, India.

COLLEGE OF NURSING

Sri Ramakrishna Institute of Paramedical Sciences
Coimbatore.

2010

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MANAGEMENT OF DIARRHEA

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Abstract

A study was conducted to evaluate the effect of polymer based oral rehydration solution for the management of diarrhea among children in a selected rural hospital, Gudalur. Ouasi experimental one group pretest posttest design was used. Purposive sampling of 26 children suffering from diarrhea with mild and moderate dehydration were selected. Modified Dehydration Scale (Duggan, 1992) was administered to assess the dehydration status of children under five years of age. Descriptive and inferential statistical methods were employed to analyse the data. Paired't' test was used to evaluate the effect of polymer based oral rehydration solution for the management of diarrhea. The study showed that polymer based oral rehydration solution is effective in the management of diarrhea among children under five years of age.

**Effect of Polymer based Oral Rehydration Solution for the Management of
Diarrhea among Children in a Selected Rural Hospital, Gudalur.**

Health is of prime concern for individuals as well as for the country at large. A country's development is measured by the health of its people. Good health requires certain effort for proper functioning of all body organs. To ensure health hygiene is the first step and it contributes to two third of health. Hygienic practice effectively reduces diarrhea and is a critical element of community child health and nutrition programs.

Children below five years of age represent about 12 percent of the general population in India. A large majority of these children live in rural, tribal and in urban slums. Further, children are the human resources of the future. Their development is in the interest of the total national development, therefore they need special attention.

Children under five years of age especially in rural areas are vulnerable to get diarrhea, because of their smaller body weight, poor immune system and high turnover of fluid and electrolytes. As a result of this most of the children are prone for diseases like poliomyelitis, tuberculosis, hepatitis B, diphtheria, tetanus and measles. Other common diseases are acute respiratory tract infection, chronic diarrheal disease, malnutrition, pneumonia and other congenital disorders.

Diarrhea is a symptom of variety of conditions, and it constitutes one of the main causes of morbidity and mortality among infants and children throughout the world. It causes 4 percent of all deaths and 5 percent of all health loss to disability. It kills around 2.2 million people globally each year affecting 15 percent of under five children in developing countries. The degree of wellness or illness, where well infants

and children are less prone to develop diarrhea than those who are ill, environmental influence, where the socio economic status contributes to the incidence of diarrhea, and age, where infants and under five children develop more frequently and have more serious manifestations of the condition than older children are the major factors that contribute to diarrhea (Dorothy, 2006).

Diarrheal disease is the second leading cause of death among under five children and is responsible for killing 1.5 million children every year. Diarrhea can last several days, and leave the body without water and salts that are necessary for survival. Most children who die from diarrhea actually die from severe dehydration and fluid loss. Children who are malnourished or have impaired immunity are most at risk of life threatening diarrhea (WHO, 2010).

Diarrhea is a symptom of infection caused by a host of bacterial, viral and parasitic origin most of which can be spread by contaminated water. It is more common when there is a shortage of clean water for drinking, cooking and cleaning and basic hygiene is important in prevention. Water contaminated with human faeces like from municipal sewage, septic tanks and latrines. Animal faeces contain micro organisms that can cause diarrhea. Diarrhea can also spread from person to person, aggravated by poor personal hygiene. Food is another main cause of diarrhea when it is prepared or stored in unhygienic conditions. Water can contaminate food during irrigation and fish and sea food polluted water may also contribute to the disease (WHO, 2010).

Diarrhea results in dehydration, if it is not treated properly. Severe dehydration, electrolyte imbalance, shock and death are the major complications can occur. Elimination of the cause of diarrhea and prevention of dehydration are the two treatment goals when the child has diarrhea. The importance of oral rehydration solution (ORS) for replacing the lost fluids by increasing the amount of liquids the child drinks has become recognized throughout the world (Pediatrics for parents, 1995).

Diarrhea, constipation and vomiting are symptoms that may be embarrassing to the child and the family. In some cultures the embarrassment of discussing these symptoms may lead to attempts to control or manage the symptom by using home remedies. Exploration of these symptoms with the family caregivers and child during the interview and ongoing assessment process is necessary (Klossner, 2006).

Since many year's people have adding a variety of compounds such as whole rice, wheat, sorghum and maize for diarrhea. The aim is to slowly release glucose into the gut and improve the absorption of water and salt in the solution. The author conclude that Polymer based ORS show some advantages compared to glucose based ORS for treating diarrhea of any cause and in diarrhea caused by cholera (Gregorio, et al., 2009).

In 1975, the World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) agreed to promote a single solution ORS. As a result of successful Oral Rehydration Therapy (ORT) programs, diarrhea case fatality rates have declined dramatically. Despite these results, many clinicians in industrialized countries have been reluctant to use ORS. This reluctance

has persisted although multiple clinical trials have documented the safety and efficacy of this therapy in developing countries. This resistance has been partially ascribed to the unsubstantiated concern that WHO-ORS may induce hyponatremia. Glucose based ORS does not reduce the duration of illness or the volume of stool output (Centre for Disease Control, 1992).

The problem with sugar based ORS is that the sugar actively draws water from the body, making diarrhea worse. The sugar is also present for only a short time before it is used or voided. In contrast, the polymers release sugar slowly lessening its ability to cause dehydration and providing a long low level source of energy, a so called “glucose battery” (Gregorio et al., 2009).

A study was conducted to assess the effect of rice based oral rehydration salts in patients with acute watery diarrhea. The results revealed that the mean stool output were lowered by 67 milliliters/kg of body weight in children and 51 milliliters /kg body weight in adults. Thereby the author concludes that rice based oral rehydration salts appears to be effective in reducing stool output in people with diarrhea (Fontaine, 1998).

A study conducted by Pizarro, et al (1991), indicated that stable, ready to use commercially prepared rice based electrolyte solutions containing rice syrup solids were more effective than glucose based solutions in promoting fluid and electrolyte absorption during rehydration in infants with acute diarrhea.

Although, dehydration caused by diarrhea is the second leading cause of death among children below five years of age, it can well be prevented by easy and effective method by using rice polymers in ORS. Polymer based ORS not only replace the fluid and electrolytes, but also reduces the stool volume, reduce the duration of diarrhea and have some nutritive value.

1.1. NEED FOR THE STUDY

Hygiene is an old concept related to health, personal and professional care practices related to most aspects of living. In hospital and in home and everyday life settings, hygiene practices are employed as preventive measures to reduce the incidence and spread of disease. Hygiene practices vary widely, and what is considered acceptable in one culture might not be acceptable in another.

About 707,000 diarrheal deaths occur in Africa, 57,000 deaths in America, 604,000 deaths in South East Asia, 16,000 deaths in Europe, 259,000 in East Mediterranean Countries and 154,000 deaths in Western Pacific due to diarrhea (WHO, 2004).

International water sanitation centre estimates the death caused by diarrhea and related diseases in 2010 as 2.2 million/year, 42,000 deaths/week, 6000 a day, 4 every minute and one every 14 seconds. Out of the total deaths 80 percent occur among first 2 years of life.

Diarrhea has a major impact on global health. It is an important area of focus not only due to its high world wide prevalence and health costs, but also for the reason that it can significantly be reduced by appropriate intervention and treatment. Diarrhea is a major cause of death in developing nations which attributes 3.4 million

deaths a year, with 80 percent deaths in under five year children and most occurring in the children between the age of six months to three years of age (Seema, 2000).

As per World bank estimates, 21 percentage of communicable diseases in India are water related. Of these diseases, diarrhea alone killed over 7 lakh Indians in the year 1999. Out of every 5 children who die of diarrhea worldwide, 1 is an Indian, 1000 die each day, 41 lose their lives every 60 minutes. The Incidence of diarrheal disease in India as per WHO 2004 is extrapolated to be 1,065,070,607 towards twice than that of the estimated population.

As per the WHO 2004 report, 1.8 million people die every year from diarrheal disease among which 90 percentage are under five children in developing countries, 88 percent of diarrheal disease is attributed to unsafe water supply, inadequate sanitation and hygiene. In south East Asia, diarrhea claims the lives of 7 lakhs of global deaths among under five year children

WHO spent about 7 to 10 million dollars on controlling diarrheal diseases in 2004-2005. World wide there are 1.9 million deaths in children under five years due to diarrheal diseases. According to WHO, about two thirds of these occur in the 15 countries in Asia and Africa. Diarrhea kills more young children around the world than malaria, AIDS and TB combine (Andrea, 2006).

Health publication, 2010 states that the best initial treatment of a child with diarrhea is with fluids and gradually reintroducing a normal diet. Replacing the fluid is more important than stopping the outflow. Sometimes parents feel compelled to give an over-the-counter anti-diarrheal drugs to stop their child's loose stools which may be a drug like loperamide. Recent research shows that using loperamide in

children, particularly below 3 years of age has little to no benefit and may cause serious side effects like dizziness, drowsiness, constipation and abdominal pain.

The development of ORT has reduced morbidity and mortality from acute diarrheal diseases, particularly in less developed countries. ORS typically consists of a mixture of electrolytes and a carbohydrate component such as glucose or sucrose. The WHO recommends that ORS that contain 20 grams of glucose, 3.5 grams of sodium chloride, 2.5 grams of sodium bicarbonate, 2.9 grams of tri sodium citrate dehydrate and 1.5 grams of potassium chloride, these are to be mixed with one liter of water for treating or preventing dehydration due to acute diarrhea in infants and children. However, while glucose based solutions stimulate the intestinal absorption of fluid secreted by the intestine and thus do not lessen the severity of diarrhea. Thus lack of efficacy in controlling diarrhea constitutes a barrier to global acceptance of ORT and indicates that there is a need for a superior product (Ndife, et al., 1996).

ORS prepared from rice may not only ameliorate dehydration, but may also decrease diarrheal fluid loss and reduce stool output. Rice is cheap, safe and easily obtained and eaten by a large fraction of world population. The rice based ORS of the instant invention, produced through a process that utilize enzymatic digestion of the cellulose and protein fractions of rice flour retains the advantages of a rice based solution and overcomes these advantages (Ndife, et al., 1996).

In a controlled trial of ORT for infants and young children with acute diarrhea the superiority of a rice based oral solution to the WHO recommended glucose electrolyte solution as shown by a lower rate of stool output, a shorter duration of diarrhea and a smaller intake of rehydration fluid (Patra, et al., 1982). A study found a

trend towards improvement in efficacy, as measured by recovery from diarrhea within 72 hours with rice based ORS (Bhan, et al., 1987).

A research conducted to evaluate the efficacy and digestibility of rice based ORT in infants less than six months old, supports the hypothesis that rice ORT can be safely and effectively used in the management of acute diarrhea in infants younger than six months of age (Islam, et al., 1994).

Glucose polymers prepared primarily from rice based solutions have been shown to be as effective as glucose based solutions. They offer additional advantage in reducing the amount and duration of diarrhea with lesser volumes of solution, thereby reducing the cost of treatment. Rice based solution provides high caloric density and increases the absorption of sodium without an osmotic overload. The result increases net absorption of glucose, sodium and water. Glucose polymers from rice or other starches in oral rehydration solution may be effective, inexpensive, easily used and safe for the treatment of acute diarrhea (Lebenthal, et al., 1991).

The major role of community health nurse is prevention. Prevention means to avert problems. Community health nurse assists people in applying improved health behavior choices to their everyday lives by adopting an immediate and easy method. Hence, an extensive survey was made to identify a suitable intervention to fight against the present problem of investigation. However, rice based ORS was found to be an appropriate solution for dehydration than any other, on in depth review of the above cited statistics and research evidences, the researcher tend to investigate the study in the tribal community. Hence, the statement of the problem was formulated as given below.

1.2. STATEMENT OF THE PROBLEM

EFFECT OF POLYMER BASED ORAL REHYDRATION SOLUTION FOR THE MANAGEMENT OF DIARRHEA AMONG CHILDREN IN A SELECTED RURAL HOSPITAL, GUDALUR.

1.3. OBJECTIVES

- 1.3.1. To assess the dehydration status of children with diarrhea.
- 1.3.2. To administer polymer based oral rehydration solution to children with diarrhea.
- 1.3.3. To assess the dehydration status and frequency of stool output after administration of polymer based oral rehydration solution.

1.4. OPERATIONAL DEFINITION

1.4.1. Effect

It refers to improvement in the dehydration status and reduction in the frequency of stool output as a result of administration of polymer based ORS.

1.4.2. Polymer based oral rehydration solution

A composition for treating diarrhea, available in powder and ready to drink forms that is suitable for under five children and comprises a nutritional substance, a synthetic fiber like pre cooked rice flour 10.33 grams and electrolytes like sodium chloride 0.52 grams, sodium citrate 0.58 grams, potassium chloride 0.30 grams and zinc sulphate 17.58 milligrams.

1.4.3. Diarrhea

The passage of loose, liquid or watery stools more than three times a day along with the signs and symptoms of mild and moderate dehydration as per Duggan scale for dehydration assessment.

1.4.4. Children

It refers to children below five years of age who came to the hospital with the complaint of diarrhea.

1.5. CONCEPTUAL FRAMEWORK

IDA JEAN ORLANDO'S NURSING PROCESS THEORY (1950)

Nursing theory is very important to the profession of nursing. The researcher adopted Ida Jean Orlando's Nursing process theory (1950). Orlando's theory remains one of the most effective practice theories. It is appealing because it clearly describes what nurses think is good nursing. Orlando specifies that both the nurse and the patient participate in the exploratory process to identify the problem as well as the solution. The patients behaviour stimulates the nurses immediate reaction and becomes the starting point of the investigation.

1.5.1. Assessment

According to Orlando assessment is a systematic collection of data to determine a person's health status and to identify actual or potential health problem. There are two types of data collected here namely subjective and objective. The gathering of data is done by means of history collection and physical assessment. In this study, the researcher collected the subjective data from the caretakers regarding

the health history of the child and the objective data was collected by using Duggan scale for dehydration assessment.

1.5.2. Nursing Diagnosis

As per Orlando diagnosis is made subsequently after assessment. The diagnosis represents an actual or potential problem of the patient. The diagnosis is made by proper analysis and synthesis of the data collected from health history and health assessment. Researcher in this study diagnosed the child based on the actual and potential problem of the child, degree of dehydration which includes mild and moderate dehydration and frequency of stool output.

1.5.3. Planning

According to Orlando after developing a diagnosis, nursing interventions are planned. Planning serves as a basis for implementation and prevents missing of any intervention that has to be made. In this study the researcher plans to administer polymer based ORS to the children with mild and moderate dehydration and to educate the caretakers how to administer polymer based ORS to their children

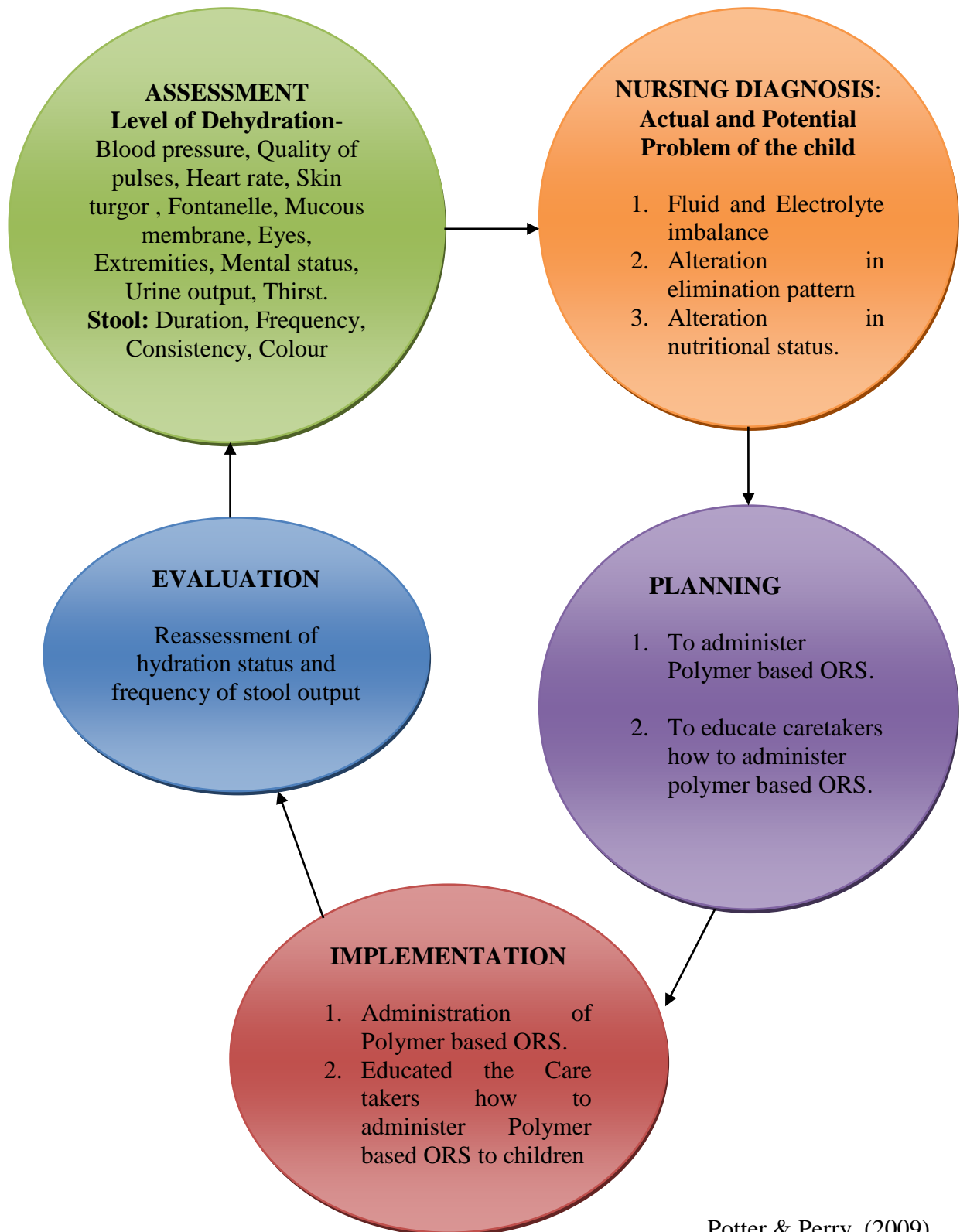
1.5.4. Implementation

As per Orlando the plan of care is actualized through nursing interventions. The proposed care of treatment is implemented by the nurse and can be altered during implementation process depending upon the patients priorities. In this study, the researcher carried out the interventions by administering polymer based ORS and by educating the caretakers on administration of polymer based ORS to their children.

1.5.5. Evaluation

Orlando determines evaluation as the patient's responses to the nursing intervention and the extent to which the goals have been achieved. In this study, evaluation was carried out by reassessing the hydration status and frequency of stool output of the children with diarrhea the next day after administration of polymer based ORS.

FIG. 1.1.
CONCEPTUAL FRAMEWORK BASED ON
ORLANDO'S NURSING PROCESS MODEL (1950)



Potter & Perry, (2009).

1.6. PROJECTED OUTCOME

Administration of polymer based oral rehydration solution helps to improve the rehydration status and also to reduce the frequency of stool output.

LITERATURE REVIEW

Literature review is an essential component for the researcher for a greater understanding of the research problem and its major aspects. It provides the investigator with an opportunity to evaluate different approaches to obtain the most current facts, and selection or development of the theoretical or methodological approaches to the problem.

The Literature review arranged in the following sections:

- 2.1. Literatures related to Diarrhea
- 2.2. Literatures related to Dehydration
- 2.3. Literatures related to Rehydration
- 2.4. Literatures related to effect of polymer based ORS on rehydration status and stool output.

2.1. LITERATURES RELATED TO DIARRHEA

Diarrhea is one of the important defences of the body. It is the way that the body hastens elimination of certain infective organism. Although one can consider taking conventional drugs to suppress the diarrhea, they simply allow the bacteria and parasites to remain in the body longer. WHO considers childhood diarrhea to be the number one public health problem in the world today (Ullman, 2004).

Diarrhea has a major impact on global health. The United States National Institute of Health (NIH) defines diarrhea as loose, watery stools occurring more than 3 times a day. Children are the most susceptible because a smaller amount of fluid

loss is necessary to result in significant dehydration, because they have fewer internal resources, and because their energy requirements are higher (Seema, 2000).

Acute infectious diarrhea causes significant alteration in fluid and electrolyte balance in both infants and children. Infants and young children have a greater need for water and are more vulnerable to alterations in fluid and electrolyte balance. Compared with older children and adults, infants have a greater fluid intake and output relatively to size. Water and electrolyte disturbances occur more frequently and more rapidly, and infants and children adjust less promptly to these alterations. Although, dehydration can result from lack of oral intake, more often it is a result of abnormal losses such as those that occur in vomiting or diarrhea, when oral intake only partially compensates for the abnormal losses (Wong's, 2005).

Diarrhea is a major cause of morbidity and remains a leading cause of death in developing nations, especially among infants and small children. Diarrhea involves an increase in stool number, a change to a more fluid consistency, or both. Diarrhea is a classical sign of gastrointestinal disease and has a wide range of etiologies. These include infections and inflammatory process, autoimmune disease, mal absorption and secretory diarrhea. Fluid and electrolyte imbalances can quickly result from diarrhea, depending on its severity (Phipps, 2009).

Diarrhea, is not a disease but a symptom. The term diarrhea may mean different to different people. Diarrhea may be acute or chronic. Acute diarrhea commonly results from infection. Bacterial or viral infection of the intestine may result in symptoms such as explosive watery diarrhea, tenesmus and abdominal pain. Symptoms continue until the irritant or causative agent is excreted. Diarrhea is

considered chronic when it last for atleast 4 weeks. Infants and the elderly are particularly vulnerable to severe diarrhea. Mal absorption and malnutrition are also sequelae of chronic diarrhea (Lewis, 2007).

Diarrhea is a common but potentially serious illness in early childhood. A child suffers, on an average of 10 to 15 episodes of diarrhea in the first five years of life. A child may loose almost as much water and electrolytes from the body during an episode of diarrhea as an adult, since the length and surface area of intestinal mucosa of a child, from where the diarrheal fluids are secreted, are fairly large. Loss of one liter of fluid from the body of a child weighing 7 kg is much more hazardous compared with a similar depletion from an adult of 70 kg weight (Ghai, 1988).

Childhood mortality rate is higher in families which are poor, living in rural areas and whose mothers lack basic education. Moreover, there is a higher incidence of diarrhea in children with uneducated mothers as compared to those whose mothers have some primary education. It was further found that knowledge about ORS was less among younger mother (15-19 yrs) than their older counterparts especially in rural setting. There was less preference towards fluid consumption during diarrhea and one of the reasons for this is directive of child's grand parents (Mukhtar, 2009).

Important fact about diarrhea is the care about children for easier course. Very often child care is not adequate because of low knowledge and attitude and wrong practice. A study conducted to assess the maternal practice on management of acute diarrhea among children under five years old reveals that, one third of the mothers did not give anything to their children in term to stop the diarrhea and which suggested an

immediate need for campaigns in order to try to change the maternal practice on management of acute diarrhea (Merita, 2009).

Comparing estimates of the current global burden of diarrheal disease with previously published estimates, highlights that the incidence of diarrhea have not changed much, although overall diarrhea mortality has declined. During 2005 about 1.07 million cases of acute diarrhea were reported in India with 2040 deaths. The actual incidence must be many folds. Diarrheal disease causes a heavy economic burden on health services. Much attention has been given to acute diarrhea and its management over the last decade, which is dominated by advances in oral rehydration techniques (Park, 2009).

2.2. LITERATURES RELATED TO DEHYDRATION

Water is a critical element of the body and adequate hydration is a must to allow the body function. Upto 75 percent of the body's weight is made up of water. Dehydration occur when the amount of water leaving the body is greater than the amount being taken in. The body is very dynamic and always changing, this is especially true with water in the body (Benjamin, 2008).

Dehydration means body does not have as much water as fluids as it should. Dehydration can be caused by losing too much fluid, not drinking enough water or fluids or both. Vomiting and diarrhea are common causes. Infants and children are more susceptible to dehydration than adults because of their smaller body weight and high turnover of water and electrolytes. The elderly, those with illnesses are also at higher risk. Dehydration is classified as mild, moderate and severe based on how

much of the body's fluid is lost or not replenished. When severe, dehydration is a life threatening emergency (Linda, 2009).

Dehydration is a major cause of infant illness and death throughout the world. Dehydration is often a result of gastro intestinal disease and diarrhea in children. Among children in United States, short term diarrhea results in approximately 200,000 hospitalization and 300 deaths per year. In developing countries, dehydration from illness is a common cause of death in under five children, accounting for above 2 million deaths per year (Crystal, 2006).

Dehydration generally become noticeable after 2 percent of one's normal water volume has been lost. Initially, one experiences thirst and discomfort, possibly along with loss of appetite and dry skin. The symptoms of mild dehydration include thirst , reduced urine volume, abnormally dark urine, unexplained tiredness, irritability, lack of tears when crying, headache, dry mouth, dizziness when standing due to orthostatic hypotension and in some cases can cause insomnia. In moderate to severe dehydration, there may be no urine output at all. Other symptoms include lethargy or extreme sleepiness, seizures, sunken fontanel in infants, fainting and sunken eyes (Byock, 1995).

The degree of dehydration is increased in children with a history of frequent, severe watery diarrhea and in children less than 6 months of age. Percentage weight loss gives the best estimate of the degree of dehydration, but this information is not always available and may not apply to all populations. Clinical assessment of dehydration can be difficult, particularly in young infants and rarely predicts the exact degree of dehydration accurately. The WHO has simplified dehydration classification,

and the clinical signs and percentage loss of body weight associated with different grades of dehydration (Elizabeth, 2004).

Swedberg and Steiner (1983) acknowledged that mortality due to dehydration is low in United States when compared with the rates in developing countries. Yet, dehydration accounts for the second highest number of non surgical hospital admissions in US. It was estimated that more than 90% of children with diarrhea could be successfully treated at home with ORT. The electrolyte concentrations of many commercially prepared ORS are not ideally proportioned. They conceded, that most infants and children with mild, acute dehydration will do well on any clear fluid diet.

The complication related to diarrhea especially dehydration is one of the leading cause of morbidity and mortality. Though it is now well established that ORT is as good as parenteral therapy for fluid and electrolyte replacements in the absence of complications like severe vomiting, paralytic ileus, refusal of feeds etc, still the science and technology of simple oral rehydration formula as recommended by WHO has not reached the villages, and to some extent the vulnerable section of urban population. Unless ORS packets are available in adequate quantities for free distribution to the needy children, dehydration related problem will be seen in the country (Santhanakrishnan and Sankaranarayanan, 1985).

2.3. LITERATURES RELATED TO REHYDRATION

Rehydration is the replenishment of water and electrolytes lost through dehydration. It can be performed by mouth (Oral rehydration) or by adding fluid and electrolytes directly into the blood stream (Intravenous rehydration). As oral

rehydration is less painful, less invasive, less expensive and easier to provide, it is the treatment of choice for mild dehydration from infectious gastro enteritis. Because Severe dehydration can rapidly cause permanent injury or even death. Intravenous rehydration is the initial treatment of choice for dehydration (Wikipedia, 1978).

According to Ministry of public health, the administration of fluids is called Oral Rehydration Therapy. This fluid can be prepared at home, or the patients can use the glucose and mineral solution ORS, beginning since diarrhea starts. Such initial treatment is based on the concept of self care. The ORT solution should be given in a small amount but frequently to ensure digestion and absorption. Also, it should be given in an amount larger than what the children usually receive. If the children are breast fed, the breast feeding should continue as usual. However, if they are formulated, the amount of formula should be reduced by half and it should be given alternatively with the ORT fluid or ORS solution (Singubol, 2006).

Introduced in 1979, Oral Rehydration Therapy became the cornerstone of programmes for control of diarrheal diseases. Oral Rehydration Therapy was considered the most significant advances of 20th century at the world summit for children in 1990. Programmes for control of diarrheal diseases was undertaken by over 150 countries including India to attain 80% ORT coverage by 1995, So that diarrheal deaths could be reduced by 50% by 2000. ORT, today is the core of management of diarrhea and includes Complete oral rehydration salts solution with composition within WHO recommended range, Solutions made from sugar and salt, Food based solutions and in presence of continued feeding a variety of commonly available culturally acceptable fluids, irrespective of presence of glucose and salt (Singh, 2002).

Treatment with ORS is simple and enables management of uncomplicated cases of diarrhea at home regardless of etiological agent. As long as caregivers are instructed properly regarding signs of dehydration or are able to determine when children appear markedly ill or appear not to be responding to treatment, therapy should begin at home. Early intervention can reduce such complications such as dehydration and malnutrition. Early administration of ORS, reduces number of hospital visits, hospitalizations and death (Center for disease control, 2003).

As countries launched diarrheal disease control programme to sell out ORS, they faced difficulties in ensuring access and achieving high coverage levels, due to inadequate manufacturing capacity. In an effort to improve provision of fluids in early diarrhea episodes to prevent dehydration, Diarrheal disease control programme promotes the use of additional home made fluids like rice water, sugar salt solution and so on (Melinda, 2010).

Oral Rehydration Therapy with the glucose and electrolyte solution recommended by the WHO and the UNICEF is the preferred method for treating children with dehydration due to diarrhea, provided that they are able to drink and do not have signs of shock. The standard remedy is the WHO/UNICEF'S reduced osmolarity ORS which contains sodium chloride 2.6 g/l, anhydrous glucose 13.5 g/l, potassium chloride 1.5 g/l, trisodium citrate 2.9 g/l and the total osmolarity of these electrolytes is 245 mmol/l. Although the solution is both safe and effective, it has important limitations. It neither reduces the rate of stool loss nor shortens the duration of illness. Mothers often do not understand the relation between diarrhea and dehydration, and their primary concern is to see the diarrhea stops (Gore, 1992).

Almost 20 years ago Wong (1981), highlighted the superior efficacy of rice water compared with WHO oral electrolyte solution for Gastro enteritis in children. Rice water significantly reduced the number of stools a day, and intravenous intervention was not necessary.

Recently 30 grams of rice powder with the recommended electrolytes has been used successfully in ORS to treat acute diarrhea. The hydrolysis of rice by intraluminal enzymes gradually yields glucose, amino acids and oligopeptides, which enhances sodium absorption through an independent carrier system. A study conducted in Calcutta using 50 grams of rice powder per litre of ORS not only effectively hydrated patients with diarrhea but also sharply reduced the stool volume (Molla, 1992).

The study results shows that, even under epidemic conditions of severe cholera or in cholera-like diarrhea, the glucose or sucrose component of ORS can be replaced by rice powder with improved results. Glucose and Sucrose are manufactured products which are costly and not always available in countries where diarrheal diseases are a problem. Rice, a staple food in many countries, reduces the fluid requirements when used in ORS and also provides increased nutrition even in the acute stage of illness. The present study has demonstrated that even the highest concentration of rice in ORS is drinkable by patients, and is highly effective, at this concentration rice-ors provides four times more calories than does standard glucose ORS (Molla, et al,1985).

A study conducted by Yip (2001) reveals that rice water decreases stool output and can be used in mild to moderate Gastro enteritis. Cheap and easily available, it is a common home or folk remedy for mild Gastro enteritis in infants and children in many South East Asian families. It has also been used in hospital pediatric practice with good results.

A study conducted to assess the effect of rice based oral rehydration salt solution on reduction of stool output and duration of diarrhea in patients with acute watery diarrhea revealed that irrespective of age, people with cholera who were given rice oral rehydration salts solution in the first 24 hours, mean stool output in the first 24 hours were lowered in children and in adults. Rice based oral rehydration salts solution appears to be effective in reducing stool output in people with cholera (Fontaine, 1998).

A controlled clinical trial of Rice - based ORS versus glucose ORS on the outcome of acute diarrhea in infants revealed that the mean stool output and mean number of episodes of vomiting were lower in rice based ORS group as compared with the glucose ORS group. All differences were statistically significant. Due to its observed superiority and low cost, the widespread use of rice ORS should be considered for treatment of acute diarrhea (Smith, 1987).

2.5. LITERATURES RELATED TO POLYMER BASED ORS ON REHYDRATION STATUS AND STOOL OUTPUT

Acute diarrhea is a major cause of childhood death in developing countries. Children are treated with ORS, which is given to help replace lost fluid and prevent further dehydration. While ORS formulations have traditionally contained sugar and

salt, new formulations have been tested that replace the sugar with sugar containing polymers from rice, wheat, sorghum and maize (Wiley, 2009).

Rice and other cereal based solutions release glucose very slowly, not only increasing the reabsorption of water and electrolyte but reducing the osmotic load as well. This slower process could reduce the stool losses and shorten the duration of diarrhea (Mathew, 2009).

Another improved ORS comprises a mixture of rice dextrin and required electrolytes. The functionality of rice dextrin in ORS is superior to glucose in infants with diarrhea, resulting in lower stool output and enhanced water retention during the initial six hours of the therapy (Tao, 1999).

Rice based ORS is being available in the trade name cerelyte which is considered safe and effective. Comparing the safety and efficacy of Cerelyte, a rice based ORS to the standard WHO formula glucose ORS concludes that Cerelyte ORS is more effective than standard glucose ORS. In a controlled study the boys who receive Cerelyte ORS had a significantly lower rate of diarrhea in the first 8 to 12 hours (Zaman, 2001).

A study conducted by Islam, et al., (1994) suggest that rice based ORT solutions have been shown to be superior to glucose oral rehydration salts in reducing the stool volume and duration of diarrhea in children and adults. Rice based ORT is well tolerated by infants.

A study was conducted to compare the safety and efficacy of a ready to use pre mixed rice based ORS with a glucose based ORS. Author concluded that rice based ORS to be safe, and its use reduced the rate of intra venous fluid therapy in comparison with the use of glucose based ORS (Maulen, 2004).

A randomized clinical trial conducted among 148 children under five years of age, suffering from acute watery diarrhea leading to moderate and severe dehydration suggests that rice ORS is a better alternative to standard glucose ORS in the management of diarrheal disease in children (Prasad, 1993).

A study conducted by Battacharya, (1998) patients who received rice- low sodium ORS subsequently had lower stool output, ORS consumption and diarrhea duration compared to the ORS groups and concludes that rice- based- low sodium ORS is superior for treating adult diarrhea.

METHODOLOGY

The present study was designed to evaluate the effect of polymer based ORS for the management of diarrhea among children. This chapter deals with the description of the research approach, research design, setting, population, criteria for sample selection, sampling, variables of the study, materials, hypothesis, pilot study, main study and techniques for data analysis.

3.1. RESEARCH APPROACH

The present study aimed to administer polymer based ORS to children with diarrhea and determining its effectiveness. Hence, an evaluative research approach was used for the study.

3.2. RESEARCH DESIGN

The research design used for the present study was quasi experimental one group pretest – posttest design. This design was found to be appropriate to evaluate the effect of polymer based ORS for the management of diarrhea among children.

3.3. SETTING

The study was conducted in Gudalur Adivasi Hospital, The Nilgiris. Since, its inception it was called as “Action for Community Organization, Rehabilitation and Development (ACCORD), a voluntary organization working for the tribal community. ACCORD initiated as a people’s organization called Adivasi Munnetra Sangam (AMS), which has 14000 member strong. ASHWINI (Association for Health Welfare in Nilgiris) a sister organization provides health care to the community. The objective of the society is to establish a health system which is accessible and

acceptable to tribal's. It is managed by tribal's themselves, presently GAH is a 25 bedded hospital and functions as a first referral unit. Adivasis access out patient and in patient care provided in GAH by doctors and trained nurses. The infrastructure of the hospital include well equipped emergency department, pediatric ward, general ward, intensive care unit, labour ward, operation theatre, sterilization unit, laboratory and pharmacy. It also provides crèches for the children of the staff. Staff works 8 hours a day, 3 shift basis. Besides GAH act as a resource centre providing training to the health volunteers and animators as a regular basis. The health animators provide basic curative and preventive care including health education, immunization, growth monitoring, antenatal care and encouragement of planned parenthood. An average of 60 cases with diarrhea report to the hospital each month.

3.4. POPULATION

The target population for the study was children under five years of age suffering from diarrhea.

3.5. CRITERIA FOR SAMPLE SELECTION

3.5.1. Inclusion Criteria

1. Children under five years of age with frequency of more than four loose or watery stools without visible blood in the stool.
2. Duration of diarrhea less than four days.
3. Diarrhea with mild and moderate dehydration based on Duggan scale for dehydration assessment.
4. Children with diarrhea withheld from anti diarrheal drugs.

3.5.2. Exclusion Criteria

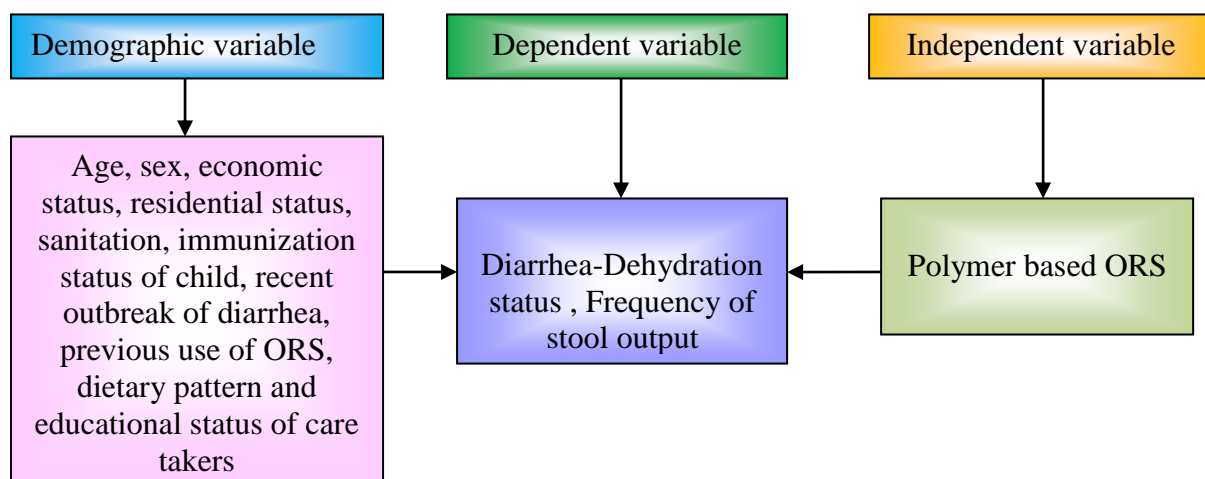
1. Children under five years of age with diarrhea associated with vomiting
2. Children under five years of age with severe dehydration.

3.6. SAMPLING

Purposive sample of 26 children below 5 years of age were taken for the study identified with mild and moderate dehydration by administering dehydration scale.

3.7. VARIABLES OF THE STUDY

Polymer based ORS is the independent variable that influence the dependent variable diarrhea or rehydration status of the child.



3.8. MATERIALS

The following materials were used for data collection

1. Baseline data
2. Checklist for assessing knowledge of practice
3. Modified dehydration scale for under five children (Duggan, 1992).
4. Checklist to assess dehydration status and frequency of stool output.

3.8.1. Demographic profile

Demographic data consists of age, sex, address, economic status, residential status which includes place of living, type of family, number of family members, type of housing, method of waste disposal and sanitation which includes type of water supply, method of defecation, method of excreta disposal, presence of breeding places, distance of latrine from, water source and immunization status of the child, recent outbreak of diarrhea, previous use of ORS, type of dietary pattern and educational status of caretakers.

3.8.2. Checklist for assessing knowledge on practice

The checklist consists of 22 questions with yes or no options. Questions highlights whether the caretakers follow hygienic practices or not. Among these 22 questions, 14 questions indicate whether the care takers follow hygienic practices or not, 4 questions regarding their dietary pattern and 4 questions purely related to infant feeding practices. Score 1 is given for 'Yes' options and 0 score for 'No' options. Below 50 percent was scored as inadequate knowledge on practice, 50- 75 percent as moderate knowledge on practice and above 75 percent as adequate knowledge on practice.

3.8.3. Modified dehydration scale for under five children (Duggan, 1992)

This scale for assessing the dehydration status of under five children was adapted from Duggan in the year 1992 which was modified by the present researcher. This scale consists of 11 variables like Blood pressure, Quality of pulses, Heart rate, Skin turgor, Fontanelle, Mucous membrane, Eyes, Extremities, Mental status, Urine output and thirst being assessed. Based on these variables the child is classified under mild, moderate and severe dehydration.

3.8.4. Checklist to assess the dehydration status

The checklist consists of assessment of dehydration status before the treatment and the next day following the initiation of treatment.

3.8.5. Checklist to assess the frequency of stool output

The checklist consists of ongoing assessment of frequency of stool output before the treatment and the next day following the initiation of the treatment.

3.8.5. Interventional procedure**Step 1**

1. Researcher assesses the degree of dehydration when the child with diarrhea is brought to the hospital.
2. Children coming under mild and moderate dehydration were selected for the study.

Step 2

1. Caretakers were detailed about the procedure and purpose of the study and a consent was obtained.
2. Polymer based ORS was administered for the children with mild and moderate dehydration
3. Caretakers were taught how to administer polymer based ORS to children.

Step 3

1. Reassessment of dehydration status the next day following the administration of polymer based ORS.
2. Reassessment of the frequency of stool output on an ongoing process for a maximum of one day.

3.8.6. Validity and Reliability of the Tools

The modified Duggan scale for dehydration assessment has a reliability coefficient of ≥ 0.60 . This tool modified by the present researcher was been validated by five experts in the field of study.

3.9. HYPOTHESIS

H₁: There is a significant difference in the dehydration status and frequency of stool output after administration of polymer based ORS.

3.10. PILOT STUDY

Prior to the main study a pilot study was conducted to check the feasibility, practicability, validity and reliability of the study. The study was conducted in Good Samaritan Hospital, Gudalur. Purposive sampling of 5 children with mild and moderate dehydration were selected for the study. After the initial assessment of dehydration status and frequency of stool output, polymer based oral rehydration solution was administered. The caretakers were taught how to administer polymer based oral rehydration solution. The next day the child was reassessed for dehydration status and frequency of stool output. The data collected was carefully analysed and there was a significant improvement in the rehydration status and reduction in the frequency of stool output and which was found feasible.

3.11. MAIN STUDY

The data was collected for a period of 30 days. The study was conducted in Gudalur Adivasi Hospital, The Nilgiris. Children under five years of age with diarrhea was assessed for mild and moderate dehydration and 26 samples were included for the study. Caretaker was detailed about the procedure and purpose of the investigation

and consent was obtained from the caretakers. Polymer based oral rehydration solution was administered to the children followed by which Caretakers were taught how to administer polymer based ORS for the children. Dehydration status and frequency of stool output was reassessed the next day.

3.12. TECHNIQUES FOR DATA ANALYSIS

Appropriate statistical tools such as descriptive statistics and inferential statistics were applied to analyse the data. Descriptive statistics was used for analysis of demographic variables, knowledge on practice and frequency of stool output. Paired 't' test was used to find out the significant difference of dehydration status before and after administration of polymer based ORS.

DATA ANALYSIS AND INTERPRETATION

The study was intended to find out the effect of polymer based oral rehydration solution for the management of diarrhea among children. Data was collected from a sample of 26 children. The findings were tabulated, analysed and interpreted in this chapter. The data was computed using descriptive and inferential statistics.

SECTION – I

4.1. BASELINE DATA PRESENTATION

The baseline data of the respondents were collected in terms of educational status, economic status, method of defecation, distance of latrine from water source, dietary pattern, type of housing and method of waste disposal. These data was presented in the form of tables and graphs.

TABLE 4.1.
DISTRIBUTION OF CARETAKERS BY EDUCATIONAL STATUS

(N=26)

Educational Status	No. of respondents	Percentage (%)
Primary	3	12
Secondary	6	23
Illiterate	17	65

Among 26 samples, 65 percent of caretakers were illiterate, 23 percent were having secondary education and 12 percent were having primary education.

FIG. 4.1.
DISTRIBUTION OF CARETAKERS BY EDUCATIONAL STATUS

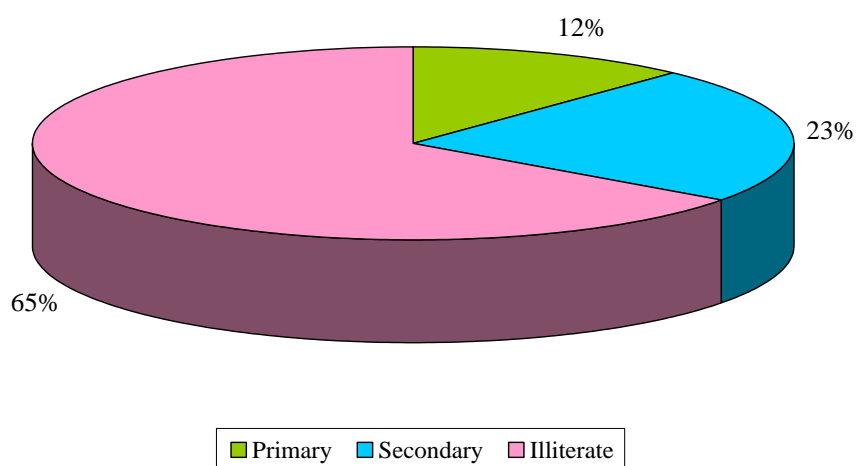


TABLE 4.2.
DISTRIBUTION OF CARETAKERS BY ECONOMIC STATUS

(N=26)

Economic status (Rs.)	No. of respondents	Percentage (%)
6750 – 13499	3	12
5050 – 6749	2	8
3375 – 5049	17	65
2025 – 3374	4	15

Among 26 samples, 65 percent of caretakers were earning monthly between Rs. 3375-5049, 15 percent of caretakers were earning an income ranging from Rs.2025-3374, 12 percent of caretakers were earning between Rs. 6750-13499 and 8 percent of caretakers were earning between Rs. 5050-6749.

FIG. 4.2.
DISTRIBUTION OF CARETAKERS BY ECONOMIC STATUS

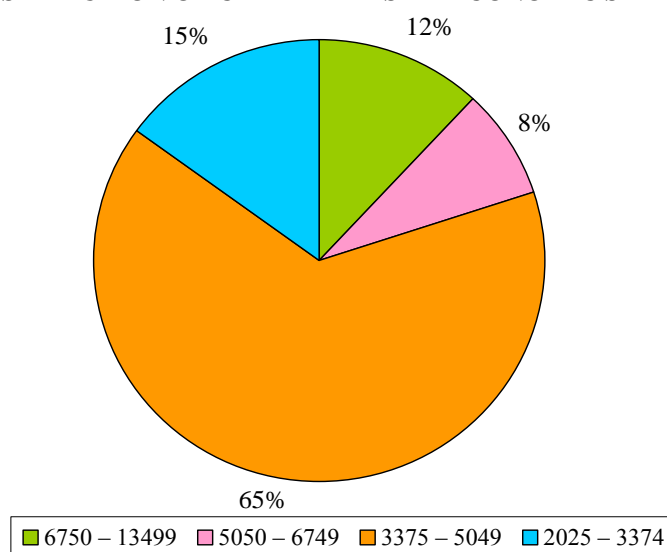


TABLE 4.3.
DISTRIBUTION OF RESPONDENTS BASED
ON METHOD OF DEFECATION

(N=26)

Method of defecation	No. of respondents	Percentage (%)
Open field defecation	10	38
Latrine	16	62

Data presented in the table reveals that among 26 samples, 38 percent were practicing open field defecation and 62 percent were using latrines.

FIG. 4.3.
DISTRIBUTION OF RESPONDENTS BASED ON
METHOD OF DEFECATION

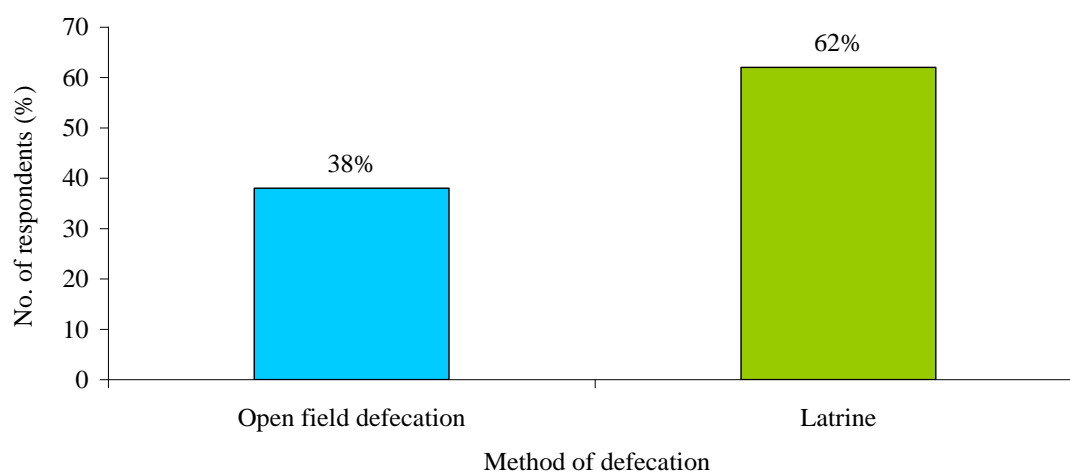


TABLE 4.4.
DISTRIBUTION OF RESPONDENTS BASED ON
DISTANCE OF LATRINE FROM WATER SOURCE

(N=26)

Distance of latrine from water source	No. of respondents	Percentage (%)
Less than 10 meters	11	42
More than 10 meters	15	58

Among 26 samples, distance of latrine from water source for 42 percent of samples were less than 10 meters and for the remaining 58 percent of samples, the distance was more than 10 meters.

FIG. 4.4.
DISTRIBUTION OF RESPONDENTS BASED DISTANCE OF LATRINE
FROM WATER SOURCE

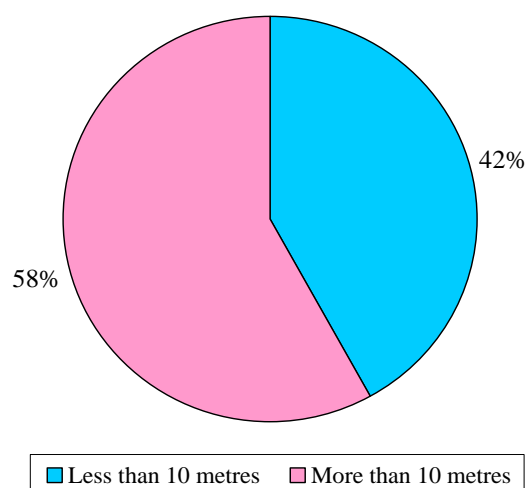


TABLE 4.5.
DISTRIBUTION OF RESPONDENTS BASED
ON DIETARY PATTERN

(N=26)

Dietary pattern	No. of respondents	Percentage (%)
Vegetarian	1	4
Non vegetarian	25	96

Data presented in the table reveals that majority of respondents of about 96 percent were non-vegetarians and the remaining 4 percent were vegetarians.

FIG. 4.5.
DISTRIBUTION OF RESPONDENTS BASED
ON DIETARY PATTERN

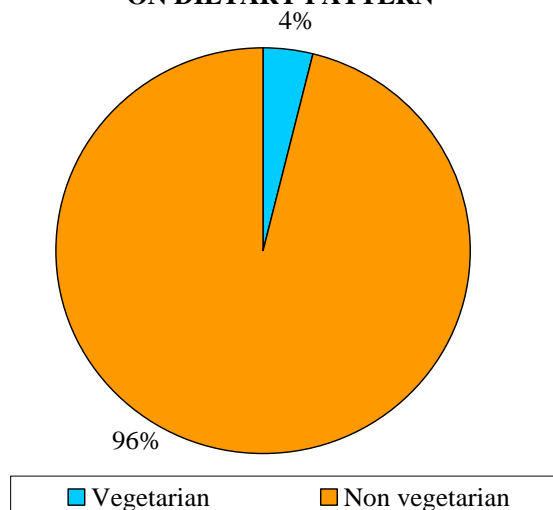


TABLE 4.6.
DISTRIBUTION OF RESPONDENTS BASED
ON THE TYPE OF HOUSING

(N=26)

Type of housing	No. of respondents	Percentage (%)
Pucca	9	35
Kucha	17	65

Among 26 samples, majority of the respondents that is 65 percent were living in kucha houses and the remaining 35 percent were living in pucca houses.

FIG. 4.6.
DISTRIBUTION OF RESPONDENTS BASED
ON THE TYPE OF HOUSING

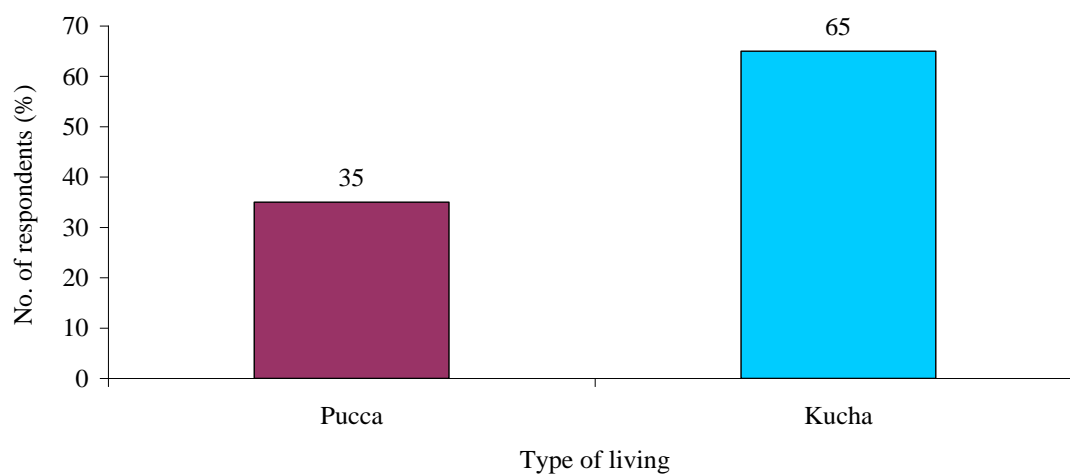


TABLE 4.7.
DISTRIBUTION OF RESPONDENTS BASED
ON METHOD OF WASTE DISPOSAL

(N=26)

Method of waste disposal	No. of respondents	Percentage (%)
Around the house	14	54
Burning	1	4
Common dustbin	11	42

Among 26 samples, 54 percent disposed off waste around the house, 4 percent disposed the waste by burning and 42 percent disposed waste in the common dustbin.

FIG. 4.7.
DISTRIBUTION OF RESPONDENTS BASED ON
METHOD OF WASTE DISPOSAL

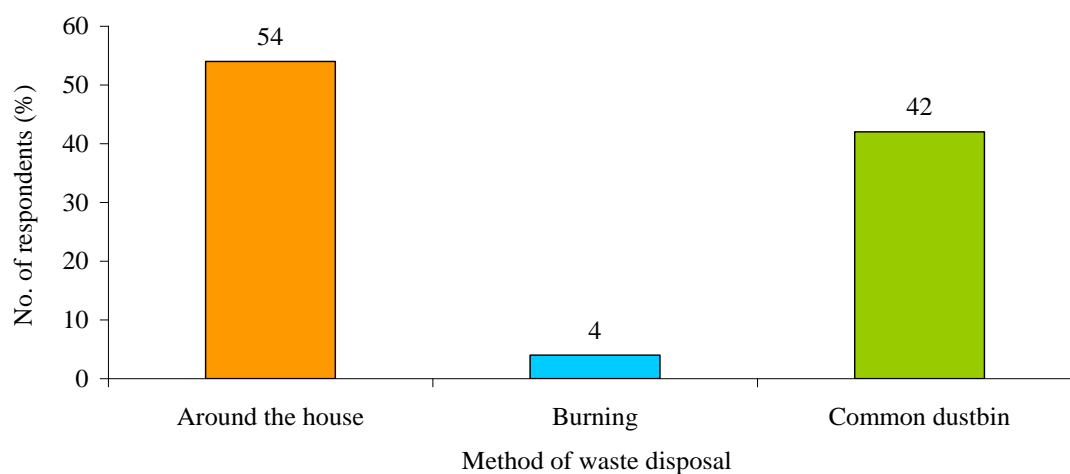


TABLE 4.8.
DISTRIBUTION OF RESPONDENTS BASED ON
THEIR KNOWLEDGE ON PRACTICE

(N=26)

Variables	No. of respondents	Percentage (%)
Children who are breast fed	7	27
Care takers who clean the breast before feeding the child	2	8
Children who are bottle fed	5	19
Use boiled feeding articles for feeding the baby each time	2	8
Gives supplementary feeding for the child	6	23
Wash hands with soap and water		
a. Before preparing food	10	38
b. Before eating	16	62
c. Before feeding the child	-	-
d. After defecation	17	65
Children those who play with soil and water	13	50
Children those who play with other children	21	81
Consumes food from outside	21	81
Caretakers who takes bath daily	16	62
Care takers who gives bath to child daily	19	73
Care takers who changes clothes daily	12	46

Variables	No. of respondents	Percentage (%)
Care takers who changes the child's clothes daily	20	77
Care takers who consumes boiled and cooled water	19	73
Care takers who provides boiled and cooled water for the child	21	81
Care takers who have the habit of cutting nails	20	77
Care takers who trim their child's nails	17	65
Care takers who wear chappels while walking outside	19	73
Children who wear chappels while walking/ playing outside	16	62

The above table reveals the distribution of respondents based on their knowledge on practice. Where only 8 percent of caretakers clean their breast before feeding the child and use boiled feeding articles for feeding the child, 81 percent of children consumes food from outside, 38 percent of caretakers wash their hands with soap and water before preparing food and none of the caretakers wash their hands with soap and water before feeding the child.

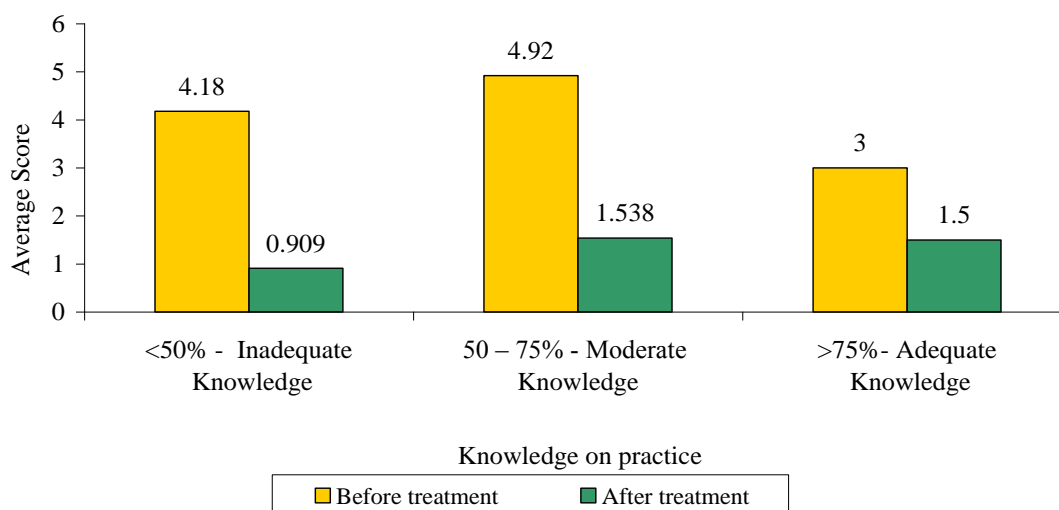
TABLE 4.9.
COMPARISON OF THE KNOWLEDGE ON PRACTICE WITH BEFORE
AND AFTER TREATMENT SCORES OF DEHYDRATION

(N=26)

Percentage of knowledge on practice	No. of respondents	Before treatment	After treatment
<50%	11	4.18	0.909
50 – 75%	13	4.92	1.538
>75%	2	3.0	1.5

The above table reveals that 11 respondents have less than 50 percent knowledge on practice, the before treatment score was 4.18 and after treatment score was 0.909, 13 respondents have 50-75 percent of knowledge on practice and their before treatment score was 4.92 and after treatment score is 1.538, and the remaining two respondents have more than 75 percent of knowledge on practice whose before treatment score was 3.0 and after treatment score was 1.5.

FIG. 4.8.
COMPARISON OF THE KNOWLEDGE ON PRACTICE WITH BEFORE
AND AFTER TREATMENT SCORES OF DEHYDRATION



SECTION – II

4.2. ANALYSIS ON EFFECT OF POLYMER BASED ORAL REHYDRATION SOLUTION

Paired 't' test was used to analyse the effect of polymer based oral rehydration solution.

TABLE 4.10.
LEVEL OF SIGNIFICANCE BETWEEN BEFORE AND AFTER
TREATMENT SCORES OF DEHYDRATION STATUS OF CHILDREN

(N=26)

Group	Mean	Mean (%)	SD	Difference	't' value
Before treatment	4.423	20.1045	2.1940	3.154	7.864**
After treatment	1.269	5.7690	0.9615		

** 0.01

The mean score of the dehydration status of the children before and after administration of polymer based ORS was 4.423 and 1.269 respectively. The table reveals that there is a positive difference in the dehydration status.

The calculated 't' value 7.864 was compared with the table value at 25 degrees of freedom with 0.01 level of significance. The calculated value was much higher than the table value, thus the alternate hypothesis is accepted. Hence there existed, a significant difference in the dehydration status among children before and after administration of Polymer based ORS. This reveals that Polymer based ORS reduces the dehydration status and frequency of stool output.

TABLE 4.11.
DISTRIBUTION ON FREQUENCY OF STOOL OUTPUT
BEFORE AND AFTER ADMINISTRATION OF POLYMER
BASED ORAL REHYDRATION SOLUTION
(N=6)

Frequency	Before		After	
	No. of respondents	Percentage (%)	No. of respondents	Percentage (%)
1	-	-	1	4
2	-	-	6	23
3	-	-	7	27
4	6	23	8	31
5	3	11	3	11
6	7	27	1	4
7	3	12	-	-
8	7	27	-	-

The above table reveals the distribution on frequency of stool output before and after administration of polymer based oral rehydration solution. 27 percent of respondents passed stools 8 times a day, 12 percent of respondents passed 7 times a day and 27 percent of respondents passed 6 times a day before administration of polymer based ORS which was significantly reduced to almost less than 6 times after administration of polymer based ORS.

RESULTS AND DISCUSSION

This chapter presents the results revealed in the present study in detail. The analysed data are discussed under various sections. The Section-A deals about the demographic data, Section – B deals with the distribution of respondents based on their knowledge on practice and Section – C effectiveness of polymer based oral rehydration solution.

5.1. SECTION – A FINDINGS RELATED TO DEMOGRAPHIC DATA OF THE RESPONDENTS

In the present study, 26 samples were selected. Among these samples, 65 percent of the caretakers were illiterate, 23 percent of them had secondary education and 12 percent of them had primary education. These findings is substantiated with the study conducted by Mahalanabis, et al., (1996) where a significant association was found to be existing between the maternal education and severity of diarrheal disease.

With respect to the economic status of the caretakers, 15 percent of the monthly income of respondents ranges between Rs. 2025-3374, 65 percent ranges between Rs. 3375-5049, 12 percent ranges between Rs. 6750-13499 and 8 percent ranges between 5050-6749. These findings are in line with the study conducted by Ahmed, et al., (1992) which reveals that there is a high incidence of diarrhea among children who belonged to low income group family.

With regard to method of defecation, 62 percent of the respondents used latrine for defecation and 38 percent followed open field defecation. In case of the distance of latrine from water source, it was less than 10 meters for 42 percent of the

respondents and more than 10 meters for 58 percent of the respondents. With regard to dietary pattern 96 percent of the respondents were Non- vegetarians and 4 percent of them were Vegetarians.

In case of method of waste disposal, 54 percent of the respondents disposed waste around the house, 42 percent of the respondents disposed waste in common dustbin and 4 percent of them disposed waste by burning method. With regard to type of housing, 35 percent of the respondents were living in pucca houses and 65 percent of the respondents were living in kucha houses. These findings goes in line with the study conducted by Punyaratabandhu, et al., (1994) which reveals that unsanitary water resources and unsanitary disposal of human excreta had strong association with diarrhea.

SECTION –B

5.2. DISTRIBUTION OF RESPONDENTS BASED ON THEIR KNOWLEDGE ON PRACTICE

In the present study, 27 percent of the children were breast fed, 19 percent of the children were bottle fed, 8 percent of the caretakers clean their breast before feeding the child, 8 percent of caretakers used boiled feeding articles for feeding the baby each time whereas, 23 percent of the children were given supplementary feeding.

With regard to washing hands with soap and water 38 percent of the caretakers washed hands before preparing food, 62 percent of caretakers washed hands before eating, 65 percent of caretakers washed hands with soap and water after defecation and none of the caretakers washed their hands with soap and water before feeding the

child. These findings are in line with the study conducted by Carabin, et al., (1999) which suggested that the promotion of hand washing with soap and water may be more effective in reducing diarrheal illnesses.

With regard to hygienic practices, 50 percent of the children play with soil and water, 81 percent of the children play with other children, 62 percent of the caretakers take bath daily and 73 percent of the caretakers gives bath to their children daily, 46 percent of the caretakers changes their clothes daily, 77 percent of the caretakers changes their child's clothes daily, 77 percent of the caretakers have the habit of cutting their nails, 65 percent of caretakers trim their child's nails, 73 percent of caretakers wear chapels while walking outside and 62 percent of the children wear chapels while walking and playing outside. These findings were in line with the study conducted by Troung (1996) which states that there exists a positive relationship between personal hygiene, sanitation and diarrheal diseases.

In relation to food hygiene, 73 percent of caretakers consume boiled and cooled water, 81 percent of caretakers provide boiled and cooled water for their children and 81 percent of the children consumes food from outside. These findings are substantiated with the study findings of Clasen (2003) that contamination of drinking water is associated with high incidence of diarrhea.

5.2.1. Comparison of the knowledge on practice with before and after treatment scores of dehydration

Comparison of knowledge on practice reveals that 11 respondents have less than 50 percent of knowledge on practice, 13 respondents have 50-75 percent of knowledge on practice and 2 respondents have >75 percent of knowledge on their

practice which goes in line with the study conducted by Suknirin (1991) on the factors affecting diarrheal preventive and self care behavior of the people in Yasothon Province, had demonstrated that factors like knowledge and preventive practice had a positive relationship with the occurrence of diarrhea.

SECTION – C

5.3. EFFECTIVENESS OF POLYMER BASED ORAL REHYDRATION SOLUTION

The comparison on the level of dehydration status among 26 children with diarrhea by using Duggan scale for dehydration assessment before and after administration of polymer based ORS reveals that there is a significant improvement in the rehydration status. Table 4(10) reveals that the mean value of dehydration before administration of polymer based ORS was found to be 4.423 and it was reduced to 1.269 after administration of polymer based ORS. The calculated value was much higher than the table value. Thus the alternate hypothesis, “ There is a significant difference in the dehydration status after administration of polymer based ORS” was proved. Hence it is clearly evident that polymer based ORS is influenced in reducing the mean score of dehydration. The findings of the present study is consistent with the study conducted by Molla, et al., (1994). The study was carried out among infants with acute diarrhea at the National Institute of child health, Pakistan. The result indicate that polymer based ORT can be effective in young infants with acute diarrhea having mild to moderate dehydration.

5.3.1. Comparison on Frequency of Stool Output

The table 4(11) depicts the comparison on frequency of stool output before and after administration of polymer based ORS. It was found that 27 percent of the respondents passed stools 8 times a day, 12 percent of respondents passed stools 7 times a day, about 27 percent of respondents passed stools 6 times a day, 11 percent of respondents passed stools 5 times a day and 23 percent of the respondents passed stools 4 times a day before administration of polymer based ORS. Whereas, after administration of polymer based ORS 11 percent of the respondents passed stools 5 times a day, 31 percent of the respondents passed stools 4 times a day, 27 percent of the respondent passed stools 3 times a day, 23 percent of the respondents passed stools twice a day and 4 percent of the respondents passed stools once a day. The frequency of stool output was significantly reduced to almost less than 6 times after administration of polymer based ORS.

The findings of the present study is consistent with the study conducted by Patra, et al., (1982) where in a controlled trial of ORT with rice based ORS and WHO recommended ORS for infants and young children with acute diarrhea, the superiority of a rice based oral solution was shown by a lower rate of stool output and a shorter duration of diarrhea.

SUMMARY AND CONCLUSION

This study was conducted with the objective to find out the effect of polymer based oral rehydration solution for the management of diarrhea among children. Polymer based oral rehydration solution improves the rehydration status and also reduces the frequency of stool output. Initially children who came to the hospital with diarrhea were assessed for the severity of dehydration using Duggan scale for dehydration assessment and those children who fell under the category of mild and moderate dehydration were selected as samples. Caretakers were detailed about the procedure and a consent was obtained. Polymer based ORS was prepared and administered for the children by the researcher followed by which the caretakers were taught how to feed the child thereafter. Dehydration status and frequency of stool output were reassessed the next day.

The conceptual framework of this study was based upon Orlando's nursing process model. An evaluative research approach has been used for the study. Review of literature brought at many facts of diarrhea, dehydration, rehydration, ORS and polymer based ORS and also highlighted the superiority of polymer based ORS when compared to WHO ORS in the treatment of diarrhea.

This study was conducted at Gudalur Adivasi hospital, The Nilgiris. A quasi experimental, one group pretest post test design was adopted for the study. Purposive sampling method was used to select the samples for the study. Total number of samples selected during the study period was 26. Paired 't' test was used to find out the relation before and after administration of polymer based ORS. This study

indicates that administration of polymer based ORS improves the rehydration status and also reduces the stool output.

On analyzing the data, the results reveals that there is a significant reduction in the dehydration status and frequency of stool output after administration of polymer based ORS.

6.1. MAJOR FINDINGS OF THE STUDY

1. The demographic variable reveals that a maximum of 65% of the caretakers were illiterates.
2. It reveals that a maximum of 65% of the caretakers were earning between Rs. 3375-5049 monthly.
3. It also reveals that 96% of the children were Non vegetarians
4. It reveals that hygienic practices influence the incidence of diarrheal diseases.
5. It also reveals that there is a significant association between the educational status and occurrence of diarrheal diseases.
6. The study shows that polymer based ORS was found to be effective in reducing the dehydration status
7. It also reveals that polymer based ORS was found to be effective in reducing the frequency of stool output.

6.2. LIMITATIONS

1. The study was limited only to children below five years of age.
2. The study was confined to small number of subjects and shorter period which limits generalization.
3. The study was limited only to children with diarrhea.

4. The weight loss could not be measured as the previous weight of the children was not known.

6.3. RECOMMENDATIONS

1. The study can be replicated with a larger size for wider generalization of findings.
2. The study can be conducted in different setting.
3. The study can be conducted in all age group.
4. A Comparative study can be undertaken between experimental and control group.

6.4. NURSING IMPLICATIONS

6.4.1. Nursing Education

Administration of polymer based ORS is a traditional method. It can be taught to the caretakers how to prepare home based polymer based ORS and how to feed the child. This does not require wide knowledge and practice. Caretakers can treat their children at home itself. This administration of polymer based ORS can be included in the nursing curriculum.

6.4.2. Nursing Administration

The Nurse administrator can draw written policies regarding polymer based ORS for the management of diarrhea among children. There by the staff nurses are kept in pace with the evidence based practice.

6.4.3. Nursing Practice

Polymer based ORS helps in the management of diarrhea among children expecting our care and concern. Demonstration of preparing ORS in the home would be more effective.

6.4.4. Nursing Research

The effect of polymer based ORS for the management of diarrhea among all age group could be studied. The merits of polymer based ORS over WHO ORS could be studied. The incidence and prevalence of diarrhea among children could also be studied.

6.5. CONCLUSION

Diarrheal disease is a major health problem among children under the age of five years. Diarrheal disease causes a heavy economic burden on health services. The present study proved that polymer based ORS is effective in the management of diarrhea among children under the age of five by improving the rehydration status and reducing the frequency of stool output.

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ANNEXURE - I

Paired 't' test

To test the hypothesis, 't' test was applied to findout the significant difference in management of diarrhea before and after administration of polymer based oral rehydration solution.

$$t = \frac{\bar{d}}{\frac{SD}{\sqrt{n}}}$$

$$SD = \sqrt{\frac{\sum (d - \bar{d})^2}{n - 1}}$$

\bar{d} = Mean of difference between pretest and post test score

SD = Standard deviation of the pre-test and post test score

n = Number of samples

APPENDIX – I

From

Ms. Linda Faria,
II year M.Sc (Nursing),
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore -641044.

To

Dr. Nandakumar,
Adwasi hospital,
Methemurda,
Coimbatore.

Through

The Principal,
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore - 641044.

Respected Sir/Madam,

Sub: Letter requesting permission for conducting the research study.

I, Linda Faria, II Year M.Sc (Nsg) in College of Nursing, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore – 641044 as a part of the curriculum under Dr. M.G. R. Medical University to conduct research, I have selected the research topic on **"Effect of Polymer Based Oral Rehydration Solution for the Management of Diarrhea among Children with Diarrhea in a Selected Rural Community"** as my research study.

I hereby request you to permit me for conducting the research among under 5 children during the month of ~~May~~^{June} and July 2010 in selected rural community. I assure that, I will adhere to your rules and regulations. So, kindly do the needful for me. I am grateful to you, when I have been given an opportunity to do my research in your hospital and thereby in the community area.

Thanking you

Yours faithfully,

Linda

(LINDA FARIA)



Selthala
PRINCIPAL
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore - 641044.

APPENDIX – II

From
LINDA FARIA
M.Sc Nursing II year,
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore -44.

Through
The Principal,
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore -44.

To

Dr. Ramishankar,
Community medicine dept.,
PSC college,
Coimbatore.

Sub: Requisition for tool Validation -reg.

Respected Sir,

I have selected a project work topic entitled, "**EFFECT OF POLYMER BASED ORAL REHYDRATION SOLUTION FOR THE MANAGEMENT OF DIARRHEA AMONG CHILDREN IN A SELECTED RURAL COMMUNITY**" for the requirement of M.Sc Nsg Degree, the following tools are tend to be used. Hence, I request you to kindly give valuable suggestion and necessary modification in the same.

Thanking you,

Yours faithfully,

Linda Faria

for 


FORMAT FOR CONTENT VALIDITY

Name of the expert : Prof. Christy mahala
Address : PSC College of Nursing

Total content for the tool : Adequate/ Inadequate

Kindly validate each tool and tick wherever applicable.

Sl. No.	No. of tool selection	Strongly agree	Agree	Need modification	Remarks
1.	Section - 1 A			✓	
2.	Section - 2 B				
3.	Section - 3 C				
4.	Section - 4 D				

Date: 3/6/20

r. chidambaram
Signature of the expert

FORMAT FOR CONTENT VALIDITY

Name of the expert : JAENY KEMP
PRINCIPAL
Address : INSTITUTE OF NURSING
G.K.N.M. HOSPITAL
COIMBATORE- 641 037.

Total content for the tool : Adequate/ Inadequate

Kindly validate each tool and tick wherever applicable.

Sl. No.	No. of tool selection	Strongly agree	Agree	Need modification	Remarks
1.	Section - 1				
2.	Section - 2				
3.	Section - 3				
4.	Section - 4				

SECTION 2 NEEDS COMPLETE MODIFICATION
AS INSTRUCTED

Date:


Signature of the Expert

FORMAT FOR CONTENT VALIDITY

Name of the expert : Dr. Ravishankar

Address : Community medicine dept,
PSC college,
Coimbatore.

Total content for the tool : Adequate/ Inadequate

Kindly validate each tool and tick wherever applicable.

Sl. No.	No. of tool selection	Strongly agree	Agree	Need modification	Remarks
1.	Section - 1			Yes	more details
2.	Section - 2		Agree		
3.	Section - 3		Agree		
4.	Section - 4		Agree		

Date: 14/5/2010

Dr. Ravishankar
Signature of the Expert

தினசரி பழக்க வழக்கங்களை கணக்கிடும் பட்டியல்

வ. எண்		ஆம்	இல்லை
1.	உங்கள் குழந்தைக்கு தாய்ப்பால் கொடுக்கிறீர்களா? *		
2.	குழந்தைக்கு தாய்ப்பால் கொடுப்பதற்கு முன்பு உங்கள் மார்பகத்தை வெந்நீர் வைத்து துடைப்பதுண்டா? *		
3.	உங்கள் குழந்தைக்கு இணை உணவு கொடுக்கிறீர்களா?		
4.	உணவு தயாரிக்கும் முன்பு உங்கள் கைகளை சோப்பு போட்டு சுத்தம் செய்வீர்களா?		
5.	உணவு உண்பதற்கு முன்பு கைகளை சோப்பு போட்டு சுத்தம் செய்வீர்களா?		
6.	உங்கள் குழந்தைக்கு தாய்ப்பால் கொடுப்பதற்கு முன்பு கைகளை சோப்பு போட்டு சுத்தம் செய்கிறீர்களா?		
7.	மலம் கழித்தப் பிறகு உங்கள் கைகளை சோப்பு போட்டு சுத்தம் செய்கிறீர்களா?		
8.	குழந்தைக்கு பயன்படுத்தும் பாத்திரங்களை வெந்நீரால் சுத்தம் செய்வீர்களா?		
9.	உங்கள் குழந்தை மற்ற குழந்தைகளுடன் சேர்ந்து விளையாடுவதுண்டா?		
10.	உங்கள் குழந்தை மண்ணிலும், அசுத்தமான நீரிலும் விளையாடுவதுண்டா?		
11.	உங்கள் குழந்தைக்கு கடைகளிலிருந்து உணவு வாங்கித்த தரும் பழக்கம் உண்டா?		
12.	நீங்கள் தினமும் குளிக்கும் பழக்கம் உண்டா?		
13.	நீங்கள் குழந்தையை தினமும் குளிப்பாட்டுவது உண்டா?		
14.	நீங்கள் தினமும் உடை மாற்றும் பழக்கம் உண்டா?		
15.	நீங்கள் குழந்தைக்கு தினமும் உடை மாற்றுவீர்களா?		
16.	உங்கள் குழந்தைக்கு கொதித்து ஆற வைத்த தண்ணீர் கொடுப்பீர்களா?		

17.	நீங்கள் கொதித்து ஆற வைத்த தண்ணீர் குடிப்பீர்களா?		
18.	உங்கள் குழந்தையின் நகங்களை வெட்டும் பழக்கம் உண்டா?		
19.	நீங்கள் நகங்களை வெட்டி சுத்தமாக வைத்துக் கொள்பவரா?		
20.	நீங்கள் வெளியில் செல்லும்போது காலணிகளை அணிவீர்களா?		
21.	உங்கள்குழந்தைக்கு வெளியில் செல்லும்போது காலணிகளை அணிவிப்பீர்களா?		

* தாய்ப்பால் குடிக்கும் குழந்தைகளுக்கு பொருந்தும்.

APPENDIX - IV

LESSON PLAN ON POLYMER BASED ORAL REHYDRATION THERAPY

LESSON PLAN ON POLYMER BASED ORAL REHYDRATION THERAPY

Name of the student teacher : Linda Faria

Name of the college : College of Nursing, Sri Ramakrishna Institute of Paramedical Sciences.

Name of the subject : Community Health Nursing

Topic : Polymer based oral rehydration solution

Method of teaching : Lecture cum discussion and demonstration

Group : Care takers of under five children

Venue : Gudalur Adivasi Hospital, Gudalur, The Nilgiris.

CENTRAL OBJECTIVES

Caretakers will gain adequate knowledge regarding polymer based oral rehydration solution and develop a positive attitude towards it and practices in day to day wise.

SPECIFIC OBJECTIVE

- On completion of the class the care takers will be able to
- Define diarrhea
- List out the causes of diarrhea
- Describe the mode of transmission
- Describe the assessment of dehydration
- Explain the management of diarrhea
- Define Polymer based oral rehydration solution
- List out the components of Polymer based ORS
- Enlist the osmolarity of Polymer based ORS
- Explain the preparation and administration of Polymer based ORS
- Explain the importance of Polymer based oral rehydration solution.

Sl. No.	Time	Specific Objectives	Content	Teachers activity	Learner's activity	A.V. Aids	Evaluation
1.	2 mts		INTRODUCTION Diarrhea disease is a major health problem among children under the age of 5 years. During 2005, about 1.07 million cases of acute diarrhea were reported in India with 2040 deaths. Diarrheal disease causes a heavy economic burden on health services. Much attention has been given to acute diarrhea and its management over the last decade, which is dominated by advances in oral dehydration techniques.				
2	1 mt	The learner can able to define diarrhea	DIARRHEA Diarrhea is defined as the passage of loose, liquid or watery stools. These liquid stools are likely passed more than three times a day.	The researcher defines diarrhea by lecture method	Listening	Oral explanation	What is meant by diarrhea?
3.	3 mts	The learner can able to list the causes of diarrhea	CAUSES OF DIARRHEA A wide assortment of organisms cause acute diarrhea. <ol style="list-style-type: none"> 1. Viruses Rotaviruses, Astroviruses, Adenoviruses Caliciviruses, Coronaviruses, Norwalk group viruses, enterovirus 2. Bacteria Camylobacter jejunic, Escherichia colia Shigella 	The researcher lists the causes of diarrhea by lecture method	Listening	Oral explanation	What are the causes of diarrhea?

Sl. No.	Time	Specific Objectives	Content	Teachers activity	Learner's activity	A.V. Aids	Evaluation
4	2 mts	The learner can able to describe the mode of transmission of diarrhea	<p>Salmonella Vibro cholera Vibrio parahemolyticus Bacillus cereus</p> <p>3. Others E. histolytica Giardie Intestinalis Trichuriasis Cryptosporidium species Intestinal worm</p> <p>MODE OF TRANSMISSION Faecal-oral route Faecal oral transmission may be water-borne, food borne, or direct transmission which implies an array of other faecal – oral routes such as via fingers, or fomits, or diet which may be ingested by young children.</p>	The researcher describes the mode of transmission by discussion method	Listening	Oral explanation	What is the mode of transmission of diarrhea?
5.	3 mts	The learner can able to describe the assessment of dehydration	<p>ASSESSMENT OF DEHYDRATION Patients should first be evaluated for dehydration and then for other problems associated with diarrhea. The signs to be evaluated are</p> <ol style="list-style-type: none"> 1. Condition and behaviour Well, alert, Restless, irritable Floppy, lethargic or unconscious 2. Eyes Normal 	The researcher describes the assessment of dehydration by discussion method	Listening	Oral explanation	How will you assess dehydration?

Sl. No.	Time	Specific Objectives	Content	Teachers activity	Learner's activity	A.V. Aids	Evaluation
			<p>Sunken</p> <p>Very sunken or dry</p> <p>3. Tears</p> <p>Does the child have tears when he cries vigorously</p> <p>4. Mouth and tongue</p> <p>Wet</p> <p>Dry</p> <p>Very dry</p> <p>5. Thirst</p> <p>Drinks normally</p> <p>Drinks eagerly</p> <p>Unable to drink or drinks poorly</p> <p>6. Skin pinch (skin turgour)</p> <p>When the skin of the abdomen or thigh is pinched and released, does the fold flatters and disappear.</p> <p>Immediately</p> <p>Slowly</p> <p>Very slowly (>2 seconds)</p> <p>7. Anterior fontanel</p> <p>Sunken</p> <p>Very sunken</p> <p>8. Arms and legs</p> <p>Warm and dry</p> <p>Cool and moist</p> <p>Cyanosed</p>				

Sl. No.	Time	Specific Objectives	Content	Teachers activity	Learner's activity	A.V. Aids	Evaluation
6.	1 mt	The learner can able to explain the management of diarrhea	9. Pulse Rapid Very rapid and weak Disappeared completely 10. Breathing Increased Management of diarrhea 1. Oral rehydration therapy Glucose based oral rehydration solution Polymer based oral rehydration solution 2. Intravenous rehydration 3. Maintenance therapy 4. Chemotherapy 5. Appropriate feeding	The researcher explains the management of diarrhea by lecture method	Listening	Oral explanation	What is the management of diarrhea?
7.	1 mt	The learner able to define polymer based oral rehydration solution	Polymer based oral rehydration solution It is defined as a composition for treating defined that is suitable for children and adults and comprises a nutritional substance, a synthetic fiber and electrolytes	The researcher defines polymer based ORS by lecture method	Listening	Oral explanation	What is polymer based oral rehydration solution?

Sl. No.	Time	Specific Objectives	Content	Teachers activity	Learner's activity	A.V. Aids	Evaluation
8.	1mt	The learner can able to list out the components of Polymer based ORS	Composition A sachet of 12grams of polymer based ORS contains Precooked rice powder 10.33 grams Sodium chloride 0.52 grams Sodium citrate 0.58 grams Potassium chloride 0.30 grams Zinc sulphate 17.58 milligrams	The researcher list out the composition of Polymer based ORS by Lecture method	Listening	Oral explanation	What are the components of polymer based ORS?
9.	1mt	The learner can able to enlist the osmolarity of polymer based ORS	Osmolarity 60 grams of polymer based ORS contains an osmolarity of Sodium 75 mosmol Potassium 20 mosmol Chloride 65 mosmol Citrate 10 mosmol Total 170 mosmol/liter	The researcher enlists the osmolarity by discussion method	Listening & observing	Oral explanation	What is the osmolarity of polymer based ORS ?
10	3mt	The learner can able to explain the preparation & administration of polymer based ORS	Preparation 1. Take 200 ml of boiled and cooled water 2. Add the contents of the sachet into the water 3. Stir the content with spoon 4. Feed the children as recommended. Administration 1. 8-12 ml/kg body weight/hour depending upon the need Administer one teaspoonful every 1-2 minutes	The researcher explains the preparation & administration of Polymer ORS by demonstration	Listening & observing	Demonstration	How to prepare & administer polymer based ORS?


Sl. No.	Time	Specific Objectives	Content	Teachers activity	Learner's activity	A.V. Aids	Evaluation
11.	2 mts	The learner can able to explain the importance of polymer based oral rehydration solution	<p>IMPORTANCE OF POLYMER BASED ORAL REHYDRATION SOLUTION</p> <ul style="list-style-type: none"> - Cost effective - Lack of complications - Lack of pain - Provides calories from complex carbohydrates - Less worry when mixing because rice based oral rehydration solution has a lower osmolarity than glucose based oral rehydration solution - Lower osmolarity also means better absorption - Sustained hydration - Taster better - Easily available - It can be prepared at home <p>SUMMARY Till now we have discussed about diarrhea, it causes, mode of transmission, management, polymer based oral rehydration solution and its importance.</p> <p>CONCLUSION Polymer based oral rehydration solution a significant advantages over standard glucose-based solutions, by accelerating the absorption of fluids and electrolyte while reducing diarrhea.</p>	The researcher explains the importance of polymer ORS by discussion method	Listening	Oral explanation	What are the importance of polymer based oral rehydration solution?

APPENDIX - V

CERTIFICATE OF ENGLISH EDITING

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the dissertation, "Effect of Polymer based Oral Rehydration Solution for the Management of Diarrhea Among Children in a Selected Rural Hospital, Gudalur " done by Linda Faria II year M.Sc Nursing, College of Nursing, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore, has been edited for English language appropriateness.

Name : Mrs Jessy Mathew, MAM, MPhil
Designation : Assistant Professor
Name of the Institution : Hindustan College of Arts & Science
Signature : 

JESSY MATHEW, MAM, MPhil
Assistant Professor
Hindustan College
Coimbatore.

APPENDIX - VI

CERTIFICATE OF TAMIL EDITING

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the dissertation, "Effect of Polymer based Oral Rehydration Solution for the Management of Diarrhea Among Children in a Selected Rural Hospital, Gudalur " done by Linda Faria II year M.Sc Nursing, College of Nursing, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore, has been edited for Tamil language appropriateness.

Name : R. Kaladevi
Designation : Teacher (Tamil) [M.A. B.Ed. N.Y. 2012]
Name of the Institution : Mow Hr Sec School
Signature : R. Kaladevi

U.S. HENDERSON, CLINICAL SUPERVISOR
-BAPPAHALLI, COIMBATORE
-INDIA

APPENDIX – VII

PHOTOS DURING INTERVENTION



